LAWRENCE
LIVERMORE
NATIONAL
LABORATORY

UCRL-CONF-224786

B365 High Efficiency Particulate Air Filter Emergency Replacement An Example of Team Work

T. Coble, C. Little, R. Johnson

September 27, 2006

B365 High Efficiency Particulate Air Filter Emergency Replacement An Example of Team Work
Livermore, CA, United States
October 2, 2006 through October 3, 2006

Updated October 14, 2003

B365 High Efficiency Particulate Air Filter Emergency Replacement

An Example of Team Work

October 2, 2006

Todd Coble
Robert Johnson
Christine Little

Outline

- ISM
- Background of the facility
- Time line of events
- Team work- how it all came together
- Lessons Learned


Project description
Define scope of work
Analyze hazards
Develop/ implement controls
Perform work
Work output
Feedback and improve
Work Safely!

Building 365

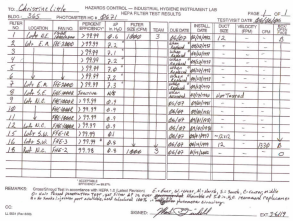
- Research building
- 1 carcinogen research laboratory and 7 Biological research laboratory.
- Building exhaust system is HEPA filtered through a bank of six filters in parallel.
- Exhaust HEPA filter system is required for work in B365.

Building HEPA Filter Exhaust System
6 Filters in Parallel

Tuesday June 6th

- IHIL staff and H&S tech perform annual certification of HEPA's at Building 365.
- Discover HEPA filtration is good but pressure differential is unsatisfactory on 6 building exhaust HEPAs.
- The plenum ductwork on the exhaust side of the HEPAs is observed surging.

Wednesday June 7th



- Receive test report.
- IHIL staff retest differential pressure confirming failure of HEPAs.
- Rooms, hoods, and bio-safety cabinets posted immediately “No Work Allowed”. Building occupants informed.
- IH consults with CBS HEPA SME on possible options for HEPA fix.

TO: Christine Little

HAZARDS CONTROL — INDUSTRIAL HYGIENE INSTRUMENT LAB
HEPA FILTER TEST RESULTS

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BLDG.: 365 PHOTOMETER HC # Ø671

TEST/VISIT DATE Ø6/Ø6/Ø6

FILTER NO.	LOCATION	FAN NO.	PERCENT EFFICIENCY*	ΔP in. H_2O	FILTER SIZE (CFM)	TEAM	DUE DATE	INSTALL. DATE	DUCT SIZE	VELOCITY (FPM)	CFM	BOX/ OPEN FACE
1	Loft N.E.	FGBE 1000/2000	> 99.99	Ø.6	1ØØØ	3	Ø6/Ø7	Ø2/18/1992	12	-	-	B
2	Loft E.M.	FFE-2ØØØ	> 99.99	7.2 °			When Replaced °	Ø8/27/1997	-	-	-	
3			> 99.99	7.1 °			When Replaced °	Ø8/27/1997	-	-	-	
4			> 99.99	7.2 °			When Replaced °	Ø8/27/1997	-	-	-	
5			> 99.99	7.Ø °			When Replaced °	Ø8/27/1997	-	-	-	
6			> 99.99	7.2 °			When Replaced °	Ø8/27/1997	-	-	-	
7	Loft E.M.	FFE-2ØØØ	> 99.99	7.3 °			When Replaced °	Ø8/27/1997	-	-	-	
8	Loft S.E.	FHE-1ØØØR	Inactive	N/S			When Activated	Ø7/17/199Ø	Not Tested			
9	Loft N.C.	FHE-1ØØØR	> 99.99	Ø.9			Ø6/Ø7	Ø9/Ø1/1981	-	-	-	
1Ø		FHE-1ØØØR	> 99.99	Ø.9			Ø6/Ø7	Ø9/Ø1/1981	-	-	-	
11		FHE-1ØØØR	> 99.99	Ø.9			Ø6/Ø7	Ø9/Ø1/1981	-	-	-	
12	Loft N.C.	FHE-1ØØØR	> 99.99	Ø.9			Ø6/Ø7	Ø9/Ø1/1981	-	-	-	
15	Loft S.W.	FFE-1R	> 99.99	Ø.1			Ø6/Ø7	Ø8/Ø1/1997	~12x12	-	-	
16	Loft S.W.	FHE-3	> 99.99 □	Ø.8			Ø6/Ø7	Ø8/19/1999	12	-	133Ø	B
18	Roof N.C.	FHE-2	99.98	Ø.8	1ØØØ	3	Ø6/Ø7	Ø1/14/2002	-	-	-	O

* ACCEPTABLE EFFICIENCY >= 99.97%

REMARKS: Gross/Shroud Test in accordance with HEPA 1.0 (Latest Revision) E. = East, W. = West, N. = North, S. = South, C. = Center, middle
O = Unit Passed penetration Test, yet Filter ΔP is over ~~recommended~~ Allowable of 5.Ø in. H_2O. recommend replacement
□ = No Smoke injection port available, used calculated 100% in ~~volometer~~ photometer circuitry.

CC:

LL 5531 (Rev 8/00)

SIGNED: Mark Tindell EXT. 3-6119

LLNL HEPA Standards

- ES&H Manual Document 12.5 HEPA Filter System Design for LLNL Applications Section 2.6.5 states.
- HEPA filters shall be replace when - pressure drop across a filter exceeds 5 inches w.g..

Possible HEPA fix options

- Replace the filter arrangement with a bag-in/bag-out filter assembly with built-in test equipment, similar to what is in the BSL3.
- Order DOE-3020-05 compliant filters and specify closed housings when they're ordered (vendors supply the additional sides and duct stubs on request).
- Try to order like-for-like filters.

Thursday June 8th

- AC mechanic and Heavy Equipment shop brought in to check exhaust fan and motor.
- Exhaust Fan and Motor determined OK.
- Determined HEPAS clogged.
- Official Stop work notice sent out by facility manager.
- Resident H&S tech discusses problem with back up tech- back up tech suggest he might know of some possible like- for- like HEPAs available.

Friday June 9th

- BIO H&S back-up tech acquires new replacement HEPAs from facility that no longer needs them.
- Facility Manager and primary H&S tech write IWS for HEPA replacement.
- Start planning for job (equipment needed, personnel, other documentation).

Monday June 12th

- IWS completed and authorized.
- Hazard Assessment and Control form completed by the Industrial Hygienist.
- H&S techs gather supplies for job.
- HEPA replacement team identified.

Tuesday June 13th

- Pre-Start/ S.P.A. meeting.
- Gather additional equipment needed as determined during Pre-Start/ S.P.A. meeting.
- LOTO of supply and exhaust systems.
- Re-brief and discuss stopping points.
- Start work and Complete HEPA replacement.
- Re-test HEPAs by IHIL. HEPAs pass

Wednesday June 14th

- AC mechanic re-balances air flow in B365.
- Technical Safety Services recertifies Bio-Safety Cabinets
- Chemical fume hoods verified operating properly.
- Installed Pre-filters…
- Building 365 Stop Work lifted by Facility Manager. Normal operations resume.

O: Christine Little

HAZARDS CONTROL — INDUSTRIAL HYGIENE INSTRUMENT LAB
HEPA FILTER TEST RESULTS

PAGE 1 OF 1

LDG.: 365 PHOTOMETER HC # 0671

TEST/VISIT DATE 06/13/06

FILTER NO.	LOCATION	FAN NO.	PERCENT EFFICIENCY*	ΔP in. H_2O	FILTER SIZE (CFM)	TEAM	DUE DATE	INSTALL. DATE	DUCT SIZE	VELOCITY (FPM)	CFM	BOX/ OPEN FACE
2	Loft E.M.	FFE-2000	99.99	1.5	1000	3	06/07	06/13/06	-	-	-	B
3	Loft E.M.		99.99	1.5				06/13/06	-	-	-	
4			99.99	1.5				06/13/06	-	-	-	
5			99.99	1.5				06/13/06	-	-	-	
6			99.99	1.5				06/13/06	-	-	-	
7	Loft E.M.	FFE-2000	>99.99	1.4	1000	3	06/07	06/13/06	-	-	-	B

No Further Entries

* ACCEPTABLE EFFICIENCY >= 99.97%

EMARKS: Gross/Shroud Test in accordance with HEPA 1.0 (Latest Revision)

C:

SIGNED: Mark Tindell EXT. 3-6119

5531 (Rev 8/00)

Photo Gallery of HEPA Change out

Crew:

Dione Ancheta

Robert Johnson

Todd Coble

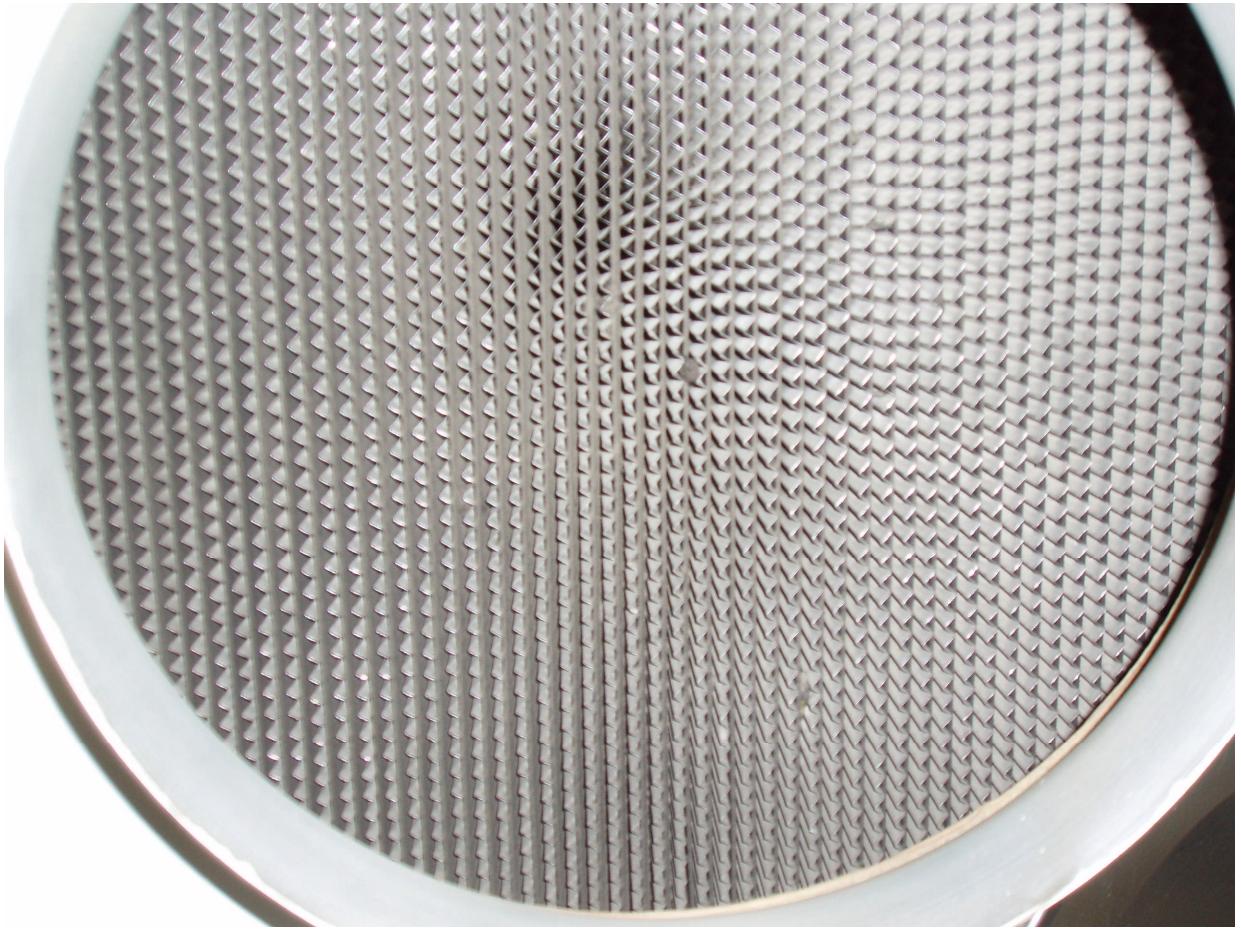
Peggy Castello

Git R' Done!

Sample/Swipe Team

On the move…. To the lay down area

The belly of the monster…



Are we there yet?

Where the Pre-filters should have gone!

CREDITS

- H&S Team 3
  - Health & Safety Technicians
    - (Primary) Todd Coble
    - (Back-up) Robert Johnson
  - IH
    - (Primary) Christine Little
    - (Back-up) Paul Davis
- Chemistry
  - Mechanical Technician
    - Dione Ancheta
- H&S Team 2
  - Health & Safety Technician
    - Peggy Castello
- Plant Engineering
  - AC Mechanic - Bill Briggs
  - Heavy Equipment Shop – Eric Yeoman, Mike Castellanos

Players Involved Continued…

- Biosciences Directorate
  - Patsy Gilbert, Select Agent Facility Manager
  - Frank Bailey , FPOC
  - Anselmo Duenas, Safety Officer
- Hazards Control- Safety Programs
  - IHIL- Bruce Bettencourt, Sterling Sawyer, and Mark Tindle
  - CBS HEPA SME- Gordon Miller
  - Respirator Services
- Outside Contractor
  - Technical Safety Services


Project description
Define scope of work
Analyze hazards
Develop/ implement controls
Perform work
Work output
Feedback and improve
Work Safely!

Opportunities for Learning…

- Safe Plan of Actions (SPAs)
- IWS Development
- Special Concerns for Biological Research Facilities
- New Health and Safety Technician cross training

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